CLAIMS

We claim:

1. A method of imaging tissue comprising:

a) administering a composition having a general formula S-L-X, wherein:

the X moiety is a carbon compound substituted with at least one atom having a K-absorption edge of about 13 keV to about 90 keV;

the S moiety is a binding moiety;

the L moiety is bonded to the S moiety and to the X moiety; and

the global logP value of said composition is greater than about 0.0;

b) generating an X-ray beam;

c) illuminating said tissue with said X-ray beam; and

c) acquiring a radiographic image of said tissue during illumination.

2. The method of claim 1 wherein said acquiring occurs during said illuminating and wherein said tissue is in vivo.

3. The method of claim 1 wherein the global logP value of said composition is greater than about 1.0.

4. The method of claim 1 wherein said X moiety is further substituted with at least one moiety having a logP value of less than about 0.0.

5. The method of claim 1 wherein the X moiety is further substituted with at least one moiety having a logP value of less than about 1.0.

6. The method of claim 1 wherein said composition is bidirectionally cell membrane-permeable.

7. The method of claim 1 wherein said composition is capable of binding to a cellular target.

8. The method of claim 1 wherein said composition is capable of binding to an enzyme.

9. The method of claim 1 wherein said composition is capable of binding to hexokinase.

10. A method of imaging tissue comprising:

a) administering a composition having a general formula S-L-X, wherein:

the X moiety is a carbon compound substituted with at least one atom having a K-absorption edge of about 13 keV to about 90 keV;

the S moiety is a binding moiety;

the L moiety is bonded to the S moiety and to the X moiety; and

the global logP value of said composition is greater than about 0.0;

b) generating a plurality of X-ray beams with predetermined different energy spectra;

c) illuminating said tissue with each of said plurality of beams;

d) acquiring a radiographic image of said tissue during illumination by each of said plurality of beams; and

e) generating a single image from at least two of said radiographic images.

11. The method of claim 10 wherein said acquiring occurs during said illuminating and wherein said tissue is in vivo.

12. The method of claim 10 wherein said plurality of beams are quasi-monoenergetic.

13. The method of claim 10 wherein said plurality of beams are monoenergetic.

14. The method of claim 10 wherein 2 beams are generated.

15. The method of claim 10 wherein more than 2 beams are generated.

16. The method of claim 10 wherein means for generating said plurality of beams with predetermined different energy spectra is disposed between means for generating said X-ray beam and said tissue.

17. The method of claim 10 wherein means for generating said plurality of beams with predetermined different energy spectra is disposed between said tissue and means for said acquiring of radiographic images.

18. The method of claim 10, further including displaying variable proportions of radiographic density contributed by said composition, soft tissue, and bone to said single image.

19. The method of claim 10 wherein the global logP value of said composition is greater than about 1.0.

20. The method of claim 10 wherein said X moiety is further substituted with at least one moiety having a logP value of less than about 0.0.

21. The method of claim 10 wherein the X moiety is further substituted with at least one moiety having a logP value of less than about 1.0.

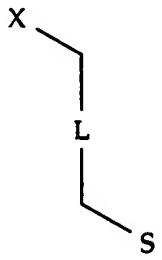
22. The method of claim 10 wherein said composition is bidirectionally cell membrane-permeable.

23. The method of claim 10 wherein said composition is capable of binding to a cellular target.

24. The method of claim 10 wherein said composition is capable of binding to an enzyme.

25. The method of claim 10 wherein said composition is capable of binding to hexokinase.

26. A composition having the general formula



wherein:

the X moiety is selected from alkyl, alkoxy, alkylthio, alkenyl, alkylamino and aryl, and is substituted with at least one atom having a K-absorption edge of about 13 keV to about 90 keV;

the S moiety is selected from pyranose and furanose;

the L moiety is selected from aryl, arylamido, alkylamido, alkyl, and thioamido, and is bonded to said X moiety and to said S moiety.

27. The composition of claim 26 wherein said at least one atom of said X moiety is selected from Br, I, and Bi.

28. The composition of claim 26 wherein said X moiety is further substituted with at least one group selected from hydroxyalkyl, alkoxy, alkloxyalkyl, alkylamido, hydroxyalkylamido, and polyhydroxyalkylamido.

29. The composition of claim 26 wherein said L moiety is an unsubstituted or substituted amidoaryl and is N-bonded to said S moiety.

30. The composition of claim 26 wherein said L moiety is further substituted with at least one group selected from nitro, amino, methyl, methoxy, and hydroxy.

31. The composition of claim 26 wherein said L moiety contains at least one N atom and is N-bonded to the S moiety.

32. The composition of claim 26 wherein said S moiety is hydroxy-substituted.

33. The composition of claim 26 wherein said S moiety is 2-hydroxy-substituted.

34. The composition of claim 26 which is 2-Amino-4-[3',5'-bis(N-acetamido)-2',4',6'-triiodophenyl]-benzoyl-D-glucosamine.

35. The composition of claim 26 which is 2,6-Diamino-4-[3',5'-bis(N-methylacetamido)-2',4',6'-triiodophenyl]-benzoyl-D-glucosamine.

36. The composition of claim 26 which is 2-Amino-4-[3'5'-bis(2,3-dihydroxypropylmethylcarbamoyl)-2',4',6'-triiodophenyl]-benzoyl-D-glucosamine.

37. The composition of claim 26 in which said X moiety is substituted with at least one atom of a radioisotope.

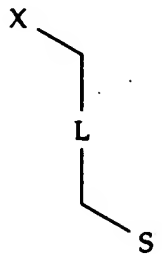
38. The composition of claim 26 in which said X moiety is substituted with at least one atom of ^{123}I.

39. The composition of claim 26 which is [^{123}I]-2-Amino-4-[3',5'-bis(N-acetamido)-2',4',6'-triiodophenyl]-benzoyl-D-glucosamine.

40. The composition of claim 26 which is [^{123}I]-2-Diamino-4-[3',5'-bis(N-methylacetamido)-2',4',6'-triiodophenyl]-benzoyl-D-glucosamine.

41. The composition of claim 26 which is [^{123}I]-2-Amino-4-[3'5'-bis(2,3-dihydroxypropylmethylcarbamoyl)-2',4',6'-triiodophenyl]-benzoyl-D-glucosamine.

42. A composition having the general formula



wherein:

the X moiety is an aryl substituted with at least one atom having a K-absorption edge of about 13 keV to about 90 keV;

the S moiety is selected from pyranose and furanose;

the L moiety is bonded to the S moiety and to the X moiety; and

the global logP value of said composition is greater than about 0.0.

43. The composition of claim 42 wherein the global logP value is greater than about 1.0.

44. The composition of claim 42 wherein said X moiety is further substituted with at least one moiety having a logP value of less than about 0.0.

45. The composition of claim 42 wherein the X moiety is further substituted with at least one moiety having a logP value of less than about 1.0.

46. The composition of claim 42 which is bidirectionally cell membrane-permeable.

47. The composition of claim 42 which is capable of binding to a cellular target.

48. The composition of claim 42 which is capable of binding to the substrate binding site of an enzyme.

49. The composition of claim 42 which is capable of binding to the substrate binding site of hexokinase.